DEVICE FOR HOLDING A CHARGING CABLE FOR ELECTRIC AND HYBRID VEHICLES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This disclosure claims priority to German Patent Application No. DE 10 2020 212 947.9, which was filed on Oct. 14, 2020 and is incorporated herein by reference in its entirety.

BACKGROUND

[0002] The disclosure relates to a cable-holding device for electric and hybrid vehicles which are provided with a rechargeable storage device for electrical energy. The storage device has a charging cable which can be connected to an external power supply device for the purpose of charging the storage device and remains permanently or at least temporarily connected to the vehicle, and the charging cable is stowed in the cable-holding device of the vehicle when not in use.

[0003] A motor vehicle in which the charging cable can be removed from the vehicle through a side opening in order to connect the plug to an external power supply device is known from DE 10 2011 116 743 A1. After charging the electrical storage device, the charging cable is pushed back into the vehicle, wherein the cable is deposited on a flat base plate in the form of just a single open loop. In such a device, a relatively large amount of space is required in order to transport the charging cable through the vehicle opening into the interior space to the depositing surface. It is furthermore a disadvantage that the charging cable needs to be dimensioned to be relatively short because the cable can be deposited on the horizontal support just in a single open loop.

[0004] A cable store for an electric charging cable is known from DE 10 2013 206 761 B4 in which the charging cable can be coiled on a rotatable drum. Such a device also requires a lot of space and its suitability for use in smaller vehicles is therefore limited. A further disadvantage of a charging cable which is completely or partly wound on a drum is the formation of a coil which results therefrom. If the cable is used for charging in this state and there is thus voltage present or current flowing, a magnetic field can consequently be generated which in turn disrupts electrical appliances in the immediate vicinity unless shielding means are installed.

[0005] The object of the disclosure is to provide a holding device for a charging cable which can be integrated comfortably into a vehicle, even into a relatively small vehicle, in a space-saving fashion, wherein it is simultaneously intended to ensure that the charging cable is not bent excessively.

SUMMARY

[0006] This object is achieved according to the disclosure by the characterizing part of claim **1**. This solution provides that a closed holding space is provided for the charging cable, that the holding space is delimited by a lower plate and an upper plate and is closed on all sides, that the clear height of the holding space is only slightly greater than the diameter of the charging cable, that the holding surface for the charging cable on the lower plate is dimensioned to be large enough that the whole charging cable can be held in the form of loops, and that the holding space has a side through opening for the charging cable.

[0007] The cable-holding device according to the disclosure is characterized in particular in that it has an extremely flat design and can thus be attached at different points of the vehicle, such as in the region of the trunk, for example, as the trunk floor or the cargo area floor, below the vehicle floor, for example, as an underbody enclosure or underbody insulation, or in the vehicle roof, for example, in the vehicle roof liner.

[0008] In order to ensure that the charging cable is deposited particularly carefully, the holding surface of the holding space is expediently arranged approximately horizontally and can optionally be coated so as to reduce friction.

[0009] The holding surface can moreover have an essentially rectangular design, as a result of which a large number of cable loops can be held and relatively large cable lengths can also be accommodated.

[0010] The side through opening for the charging cable may be delimited by two rotatable guide rollers or transport rollers, the axes of which are arranged perpendicular to the direction in which the charging cable passes through.

[0011] The bearing surfaces of the guide rollers or transport rollers between which the charging cable is guided expediently have a concave design such that the charging cable is guided reliably.

[0012] In such an arrangement, the bearing surfaces of the guide rollers or transport rollers can have a roughened or toothed design such that good frictional contact between the charging cable and the bearing surfaces of the guide rollers or transport rollers is ensured. The bearing surfaces can also be provided with suitable coatings in order to improve the frictional contact.

[0013] In order to further improve the frictional contact and in particular to compensate tolerances in the diameter of the charging cable, at least one of the two guide rollers or transport rollers can be spring-loaded in the direction of the counter-roller.

[0014] It is furthermore possible to design the guide rollers or transport rollers as spring rollers, the springs of which are tensioned when the charging cable is pulled out from the holding space and are relaxed when the charging cable is introduced into the holding space, consequently assisting the retraction of the charging cable.

[0015] It is alternatively possible that at least one of the guide rollers or transport rollers can be driven by an electromotor in both directions of rotation. Other suitable drives are alternatively also possible.

[0016] The two guide rollers or transport rollers can, for example, be provided with cogwheels which are arranged on their axes of rotation and engage with each other, one of which engages directly or indirectly with the output pinion of an electric motor. A uniform, opposite rotation of the guide rollers or transport rollers is ensured by such an arrangement.

[0017] In another alternative embodiment, the guide rollers or transport rollers can be designed so that they are divided centrally into two halves perpendicular to their axes of rotation, wherein at least one of the two roller halves is pretensioned elastically against the other roller half by a spring mechanism. Such a construction has the advantage that the rollers can also optimally bear against the peripheral surface of the charging cable when the distance between the